

Appl. No. 10/665,865

Reply to Office Action of October 24, 2005

REMARKS/ARGUMENTS

Claim 3 is indicated to be allowed. Claim 4 is indicated to be allowable as amended above. Claim 2 is indicated to have allowable subject matter. This leaves the issue of allowance of the subject matter as claimed in claim 1.

Concerning the objections to the specification, the erroneous entries noted by the Examiner were caused by a clerical error in preparing the Tables. Corrections are made hereinabove.

The rejections of claim 1 over JP 403044422 is being maintained. The distinctions pointed out by applicant are noted by the Examiner but are considered essentially an obvious modification or maybe a design choice. More specifically, the Examiner stated

"It is the examiner's position that Sb is added only to avoid the extra step of decarburization, and it would seem an obvious modification to omit Sb if one skilled in art preferred to decarburize. Note that the omission of an element with the consequent loss of its function would not be a patentable distinction."

The Examiner further stated:

"In regard to the process, it is the examiner's position that it would be well

Appl. No. 10/665,865

Reply to Office Action of October 24, 2005

within the skill of the artisan to omit Sb and then decarburize, which would meet recited claim 1. Since process and compositional steps are closely met, then high hardness values would also be expected."

However, the steel defined in claim 1 of the present application was developed with an aim to a use wherein decarburization should never be effected.

If decarburization is effected, the following problems will be caused and the steel defined by claim 1 of the present application is unable to be obtained.

(1) Because the carbon content is decreased, "more than 50 carbides having a diameter of 1.5 μm or larger exist in 2500 μm^2 of observation field area of electron microscope "recited in claim 1, is unable to be satisfied. As a result, as set out in the specification of the present application from line 5 from the bottom of page 6 to line 8 on page 8, in "(i) hardenability and toughness" under a heading of, "EMBODIMENTS OF THE INVENTION,"

"all the carbides are dissolved into the austenite phase when quenching, so that the austenite grains are remarkably coarsened and the toughness might be deteriorated".

(lines 2 to 8, page 8 of the English specification of the present application)

Appl. No. 10/665,865

Reply to Office Action of October 24, 2005

As set forth in the "DISCLOSURE OF THE INVENTION" from lines 5 to 1 from the bottom of page 5,

"it is an object of the invention to provide a high carbon steel sheet having excellent hardenability."

Excellent hardenability means that hardness after hardening is high. High hardness after hardening is determined by the amount of a supersaturated solid-soluted carbon content and the hardness becomes high as carbon content increases. Therefore, if decarburization is effected, the carbon content is decreased and the hardness after hardening is decreased and therefore, contrary to the Examiner's conclusions, high hardenability is unable to be secured.

As set forth at lines 5 to 13 on page 10 of the specification of the present application, in "(4) Secondary annealing," under the heading of "EMBODIMENTS OF THE INVENTION" , the distribution configuration of carbides gives extensive effects on the Δr . When decarburization is effected, a parameter of planar anisotropy of r-value, such as that defined in claim 1, cannot be achieved, even secondary annealing defined in claims is carried out. As a result, as set out under the

Appl. No. 10/665,865
Reply to Office Action of October 24, 2005

heading, "(ii) Dimensional precision when forming", at the 9th line to line 5 from the bottom on page 8, dimensional precision when forming cannot be obtained.

Considering the Examiner's reasoning for maintaining the rejection as compared with the explanation provided above, it is submitted that the characteristics of steel of the invention as compared with the art is per se so different, that the art of claim 1 of the present application is dissimilar to that of the cited reference JP 3-44422 and the present invention cannot be obvious from the teaching in JP 3-44422.

Differences between claim 1 of the present application and the teaching of the cited reference JP 3-44422 is further described below.

The following features of steel defined by claim 1 of the present application cannot be obtained by the manufacturing method (wherein, descaling process is deleted) of the cited reference JP 3-44422 (Sumitomo Metal Industries, Ltd.).

(i) Planar anisotropy Δr of the r-value

It is conceivable that if a type of steel of JIS defined in claim 1 of the present application is subjected to annealing after hot-rolling, without applying a descaling process, as in

Appl. No. 10/665,865

Reply to Office Action of October 24, 2005

the case of JP 3-44422, because Sb addition is not in claim 1 of the present application, there arises decarburization and concentration gradient of carbon takes place in the thickness direction of the steel sheet. This is explained in the present specification under the heading of "(4) Secondary annealing" at lines 5 to 13 on page 10: the distribution configuration of carbides gives extensive effects on the Δr and therefore, it is fully conceivable that the feature specified in claim 1 is unable to be secured, even if secondary annealing defined in claims is carried out.

(ii) Hardness after hardening

If a type of steel of JIS defined in claim 1 of the present application is subjected to annealing after hot-rolling, without applying a descaling process, as in the case of JP 3-44422, because Sb addition is not specified by claim 1 of the present application, there arises decarburization and a predetermined hardness after hardening, which is set forth in the invention of the present application, will be most possibly unobtainable.

Further with respect to the Examiner's position that "...it would seem an obvious modification to omit Sb if one skilled in the art preferred to decarburize", normally, an application of a

Appl. No. 10/665,865

Reply to Office Action of October 24, 2005

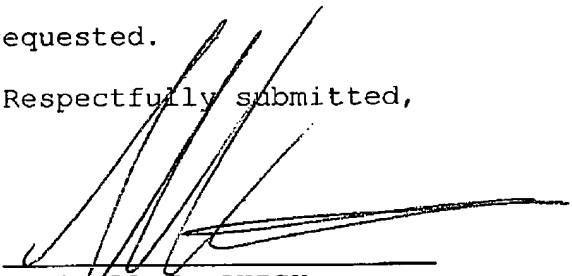
decarburization process is not preferable because decarburization causes reduction in hardness after hardening, which results in deterioration of abrasion resistance. In the present invention a descaling process is described from the viewpoint that decarburization should be avoided.

In view of the above, it is submitted that claim 1 of the present application, when compared with the cited reference JP 3-44422, has differences in terms of chemical compositions and processes and it is highly possible that the qualities of the steel sheets originated in the differences are disparate. Applicants therefore submit that claim 1 of the present application is not obvious from the cited reference JP 3-44422.

Withdrawal of the rejections and allowance of the application are respectfully requested.

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Respectfully submitted,



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